



Spectral Gamma-Ray Borehole Log Data Report

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Borehole

50-12-07

Log Event A

Borehole Information

Farm : <u>T</u>	Tank : <u>T-112</u>	Site Number : <u>299-W10-140</u>
N-Coord : <u>43,305</u>	W-Coord : <u>75,855</u>	TOC Elevation : <u>671.82</u>
Water Level, ft : <u>90.10</u>	Date Drilled : <u>3/31/1974</u>	

Casing Record

Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>94</u>	
Type : <u>Steel-welded</u>	Thickness : <u>0.250</u>	ID, in. : <u>4</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>94</u>	

Cement Bottom, ft. : 94 Cement Top, ft. : 0

Borehole Notes:

Borehole 50-12-07 was drilled in March 1974 to a depth of 94 ft. A 6-in. casing was installed from the ground surface to total depth. In August 1980, the 6-in. casing was perforated from 0 to 20 ft and 92 to 94 ft and a 4-in. casing was installed inside the 6-in. casing. The annular space between the two casings was filled with grout. The casing wall thickness is assumed to be 0.237 in. for the 4-in. casing and 0.280. in for the 6-in. casing.

The tops of both casings are approximately even with the ground surface. The top of casing, which is the zero reference for the SGLS, is at an elevation of 671.82 ft.

Equipment Information

Logging System : <u>2B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>10/1997</u>	Calibration Reference : <u>GJO-HAN-14</u>	Logging Procedure : <u>MAC-VZCP 1.7.10-1</u>

Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>12/09/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>200</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>46.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>2</u>	Log Run Date : <u>12/10/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>91.5</u>	Counting Time, sec.: <u>200</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>45.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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Logging Operation Notes:

The borehole was logged in two runs on December 9 and 10, 1997. The total logging depth achieved by the SGLS was 91.5 ft. Spectra were collected at intervals of 0.5 ft., using a 200-s count time for each interval. At the time of logging, there was a small amount of water in the hole. The depth to water inside the casing was measured at 90.1 ft. This water probably ran into the borehole from the ground surface and did not drain from the casing because the bottom of the borehole is plugged with grout.

Analysis Information

Analyst : R.G. McCain

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 05/14/1998

Analysis Notes :

The pre-survey and post-survey field verification measurements met acceptance criteria established for peak shape and system efficiency. Energy and resolution calibrations from appropriate verification spectra were used to establish the channel-to-energy conversion and peak resolution parameters used in processing the spectra acquired during the logging operation.

Peak spreading associated with the relatively thick double casing and annular grout was encountered, and many lines associated with naturally occurring radionuclides were poorly defined. Also, the peak recognition software frequently indicated false peaks in the tails of significant peaks, particularly the K-40 peak at 1460.8 keV, the 1764.5-keV peak associated with the U-238 decay chain, and the 2614.6-keV peak associated with the Th-232 decay chain. These peaks were manually deleted.

A casing correction factor for 0.50-in.-thick steel casing was used to determine concentration data over the entire depth. This factor most closely matches the combined thickness of the 4-in. and 6-in. casings. Concentrations are lower than actual because there is no allowance for the effects of the annular grout between casings.

Shape factor analysis was not performed because there was little indication of man-made radionuclides and because the effects of the dual casing and annular grout on the shape factors are not well understood.

Log Plot Notes:

Separate plots show the man-made and naturally occurring radionuclides. Concentrations are shown as apparent concentrations to reflect the uncertainty associated with the dual casing and annular grout. The headings of the plots identify the specific gamma lines used to calculate concentrations. Uncertainty bars in the plots show statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plot indicate the MDL, which represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes man-made and natural radionuclides, the total gamma count rate derived from the spectral data, and the Tank Farms gross gamma log. The latest available gamma log is shown on the combination plot. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.



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Results/Interpretations:

The only man-made radionuclide detected in this borehole was Cs-137. Cs-137 contamination was detected continuously from the ground surface to a depth of 24 ft. Concentrations generally ranged from 0.2 to 0.5 pCi/g, with peaks to approximately 2 pCi/g from 4 to 5.5 and 15 to 15.5 ft. The dual casing precluded the use of shape factor analysis to determine whether the contamination is on the casing or distributed within the formation.

K-40 concentrations range from about 8 to 12 pCi/g from the ground surface to about 38 ft and then increase slightly to about 10 to 14 pCi/g over the remainder of the borehole. This increase in K-40 concentrations is probably caused by a change from backfill material above this depth to the undisturbed Hanford formation sediments below this depth.

U-238 and Th-232 concentrations fluctuate about 0.5 pCi/g over the length of the borehole.

The SGLS total gamma-ray plot reflects the changes in the KUT and Cs-137 concentrations detected throughout the logged interval.